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*Introduction*: The advent of digital radiography and image archiving has produced many benefits. Storage and retrieval of images involves less expense, space and personnel. Studies can be distributed between hospitals as patients' care is transferred. Although solutions are available to enable preoperative templating from digital images, the availability of such software and training in its use is limited. The aim of this study was to determine whether the size of a tibial or femoral nail can be accurately predicted from non-calibrated images without the use of specialised templating software.

*Methods*: Over a two year period 83 patients who had undergone intramedullary nailing of lower limb diaphyseal fracture were identified. Using PACS software, one observer measured the width of the medullary canal at the isthmus and the length of the bone from nail insertion point to distal physeal scar. Theatre records were reviewed to determine length and diameter of nail inserted and size of endcap, if used. Nail dimensions were measured on postoperative radiographs to determine the consistency in magnification of the digital images.

*Results*: When canal diameter was measured on an AP view of the long bone, the Spearman correlation coefficient with diameter of nail used was 0.626. When the diameter on a lateral view was used, correlation increased to 0.716. The correlation coefficient between templated length and actual length of nail including endcap was 0.885. The median magnification on the postoperative radiographs was 110% (standard deviation ± 10%, interquartile range 106% - 120%).

*Discussion*: Our results demonstrate poor correlation between templated nail size and nail size selected intraoperatively. If the variability in magnification on preoperative images is similar to that observed in the postoperative images, this would suggest that, unless radiographs are taken with the use of a scaling marker, preoperative templating using PACS is inherently unreliable.

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## Radiological diagnosis of acute traumatic lumbosacral spondylolisthesis with multiple high-energy injuries

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*Introduction*: A retrospective study of 3 patients with acute traumatic lumbosacral dislocation referred to our Spinal Unit. Medical notes and imaging were reviewed. Patients were followed up till discharge.

*Aims*: To discuss the difficulty in making an accurate diagnosis in the setting of patient's with multiple concomitant high-energy injuries. To evaluate the usefulness of both MR and CT modalities in diagnosing acute versus chronic lumbosacral spondylolisthesis.

*Findings*: All patients were involved in high-energy accidents. Patient 1 was a tree surgeon who was involved in an occupational accident resulting in a tree landing on the patient. Patient 2 was the driver of a car who had a head on collision with a lorry. Patient 3 had a known psychiatric history and attempted suicide by jumping from a height. All patients had an associated injury including; head injuries (depressed skull fracture), facial injuries (orbital and temporomandibular fracture dislocation), chest injury (multiple but no neurological deficit was noted. Plain radiographs revealed a spondylolisthesis which was confirmed on CT scanning. Patient 3 had a pre-existing lytic spondylolisthesis. A definitive diagnosis of acute traumatic lumbosacral injury was made after MRI scanning utilising standard and STIR sequences showing acute rupture of L5/S1 disc and posterior tension band with extensive soft tissue oedema. All patients were managed operatively by decompression and posterolateral instrumented fusion.

*Conclusion*: Acute traumatic lumbosacral spondylolisthesis is a rare injury pattern which occurs exclusively as a result of high-energy trauma. The acute presentation may be confusing in the presence of poor compliance to examination, distracting injuries and lytic spondylolisthesis. Meticulous clinical examination and careful assessment of imaging, including CT and MRI, assists an early and accurate diagnosis in cases of lumbosacral injuries. Prompt decompression and instrumented fusion restores segmental stability and painless function.

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## Radiation exposure in uni-planar fluoroscopy guided percutaneous vertebral body augmentation procedures

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*Introduction*: Percutaneous vertebroplasty and kyphoplasty procedures involves significant radiation dose which is directly related to the duration of fluoroscopic guidance. The aim of this study was to evaluate the radiation doses and fluoroscopic screening time in percutaneous vertebral body augmentation (VBA) procedures in order to setting up the local 'diagnostic reference levels.'

*Materials and methods*: Between January 2008 and January 2010, total fluoroscopy time and resultant dose-area product from each fluoroscopic exposure were monitored in 26 consecutive patients undergoing vertebral body augmentation procedures. There were 16 patients underwent vertebroplasty procedures (17 levels) and 10 kyphoplasty procedures (14 levels) performed by a single surgeon. Third quartile values were taken for setting the 'diagnostic reference levels.'

*Results*: There were 26 cases underwent 31 level procedures (single level in 22, two level in 3 and three level in 1). There were 13 women and 13 men at the mean age of 63 years (range, 43-92 years). The average fluoroscopy time per procedure was 178 s (range, 18–367 s). The average radiation dose per procedure was 1083.9 cGyCm$^2$ (range, 55.4–7109). In order to setting the 'diagnostic reference levels,' third centile were calculated as 1190.2 cGyCm$^2$ radiation dose per level and 211.8 s per level of vertebral body augmentation.

*Conclusions*: With regard to radiation dose per level of VBA, we found 1190 cGyCm$^2$ radiation dose and 212 s time per level of vertebral body augmentation as third quartile locally. On comparing these values to published literature, our radiation doses were comparable and significantly lower on comparing against bi-planar and CT-assisted VBA. To take this study further, we are now including VBA done by neurosurgeons and radiologists to evaluate differences in radiation doses and times.

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